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A Categorization Model of the “Hows” of Using History in Mathematics Education: An Empirical Study

Abstract

The research on how to integrate the history of mathematics (HM) in mathematics education (ME) can guide the teaching practice directly, promoting the better use of HM in ME. Many scholars have done research on how to use HM in ME (e.g. Tzanakis & Arcavi, 2000; Jankvist, 2009). The previous discussions about how to use HM in ME can be divided basically into the following four dimensions: the type of history in use (anecdotes, historical issues, etc.); the ways that HM can be used in ME (the illumination approaches, the history-based approaches, etc.); different sizes and scopes in which HM can be used in EM (1 class periods, 10–20 class periods, etc.); the forms students work with history (worksheets, student-projects, etc). The reason why the HM should be integrated in ME in China is that the HM has 6 values: the harmony of knowledge, the beauty of ideas or methods, the pleasure of inquiries, the improvement of capabilities, the charm of culture and the availability of moral education, which can help to achieve the goal of teaching (Wang, 2017). Because there are a lot of characteristics specific to the Chinese mathematics classroom (for instance, the teaching rhythm is fast, the teaching structure is clear, etc.), the ways in which HM can be used in the mathematics classroom are somewhat different from other countries, and it is very difficult to analyze the ways of using HM in the Chinese mathematics classroom with the existing classification framework. Based on this, this study aims to construct a classification framework of the ways with which HM can be used in the Chinese mathematics classroom.

Combining the existing research about how to use HM in ME and the overall situation of the application of HM in Chinese mathematics class, this research puts forward a new categorization model about the ways that HM can be used in Chinese mathematics classroom. Focusing on one material in HM, there are three ways of applying HM: complementation, replication and accommodation. Focusing on the role of HM in the teaching process, there are two ways of applying HM: creation and reconstruction. Afterwards, 20 well-chosen HPM lessons (the lessons featuring HM) are coded with the new categorization model. By analyzing the coding results, some subcategories of each method in the classification framework are obtained. As an illustration, an example is given for each subcategory, which comes from the 20 well-chosen HPM lessons, and the value of each subcategory is given as well. Finally, we elaborate the connotation of the 5 approaches in the new categorization model.
